

Budd Inlet Dissolved Oxygen TMDL

Project Plan

August 1, 2016

1: Scope detail

Develop the Total Maximum Daily Load (TMDL) for Dissolved Oxygen (DO) in Budd Inlet. The TMDL will explain the roles, authorities, and actions needed of cleanup partners to address water quality issues related to DO. These partners include local governments, tribes, agencies, and the community. The TMDL prioritizes specific actions to control and reduce pollution sources needed to improve water quality and achieve Washington State water quality standards (WQS) for DO in Budd Inlet.

The report, *referred to as the Budd Inlet Dissolved Oxygen TMDL*, will establish numeric load allocations (LA) and wasteload allocations (WLA) needed to reduce human impacts on DO to meet WQS. The WLAs will get incorporated into the appropriate permits upon their renewal. The TMDL will consider impacts from the Deschutes River as reported in the Deschutes River, Percival Creek, and Budd Inlet Tributaries Multi-Parameter TMDL completed in 2015. Due to the complexity of the issues related to Budd Inlet and Capitol Lake, we phased the work by separating the freshwater and marine water TMDLs.

Management activities required include: addressing sources outside of Budd Inlet, all contributing wastewater treatment plants, local watershed sources; and impacts from the Capitol Lake dam.

Waterbody	Parameter	Listing ID
Budd Inlet	Dissolved Oxygen	3769, 5852, 5853, 5862, 5863, 5864, 7582, 7583, 7584, 7585, 7586, 7587, and 10188

Table 1: Listings included

Exclusions: This TMDL is not addressing the following listings.

Waterbody	Parameter	Listing ID
Budd Inlet	Bacteria	45317, 45829, 61005
Capitol Lake	Bacteria	40588
Capitol Lake	Total Phosphorus	22718

Table 2: Listings excluded

Budd Inlet

In Budd Inlet, the WQS is for protected use of aquatic life, with a minimum DO of 5.0 mg/L or 6.0 mg/L depending on the locations. The WQS also state that when the DO is naturally below these numeric standards, humans cannot cause DO to degrade by more than 0.2 mg/L. We need to reduce the combined human sources of pollution to meet the WQS. Previous model results found that human activities cause DO to decline below the numeric standard and by more than 0.2 mg/L below natural conditions.¹

Budd Inlet is impacted by wastewater treatment plants (WWTPs), *(including local plants and potentially WWTP discharges coming in from plants located outside the northern boundary)*, nonpoint sources (NPS) coming into Budd Inlet, and the Capitol Lake dam itself. The external nitrogen sources will be identified by

¹ We do not know the full extent of the external human sources coming from north of Budd Inlet. Additional computer modeling from the Environmental Assessment Program (EAP) will help identify those sources.

additional modeling. These sources could include rivers and WWTPs located in Ecology's Northwest and Southwest Regions (for example, the Nisqually River and Chambers Creek WWTP).

The depletion of DO caused by the dam is due to a combination of factors, including:

- The dam creates a pulsed flow that alters circulation in southern Budd Inlet.
- The dam and lake alter the concentrations and loads of carbon.
- The dam and lake alter the concentrations and loads of nitrogen. The assimilation of inorganic nitrogen by freshwater plants (for example, phytoplankton) with corresponding production of organic carbon alters discharges into Budd Inlet.

The production and decomposition of inorganic carbon is the process that is most responsible for depletion of DO in Budd Inlet. Capitol Lake is significantly more efficient at producing organic carbon than a natural estuary. The greater production of organic carbon within the lake compared with a natural estuary leads to a greater depletion of DO in Budd Inlet. Decomposition of the excess organic matter is the mechanism of DO depletion.

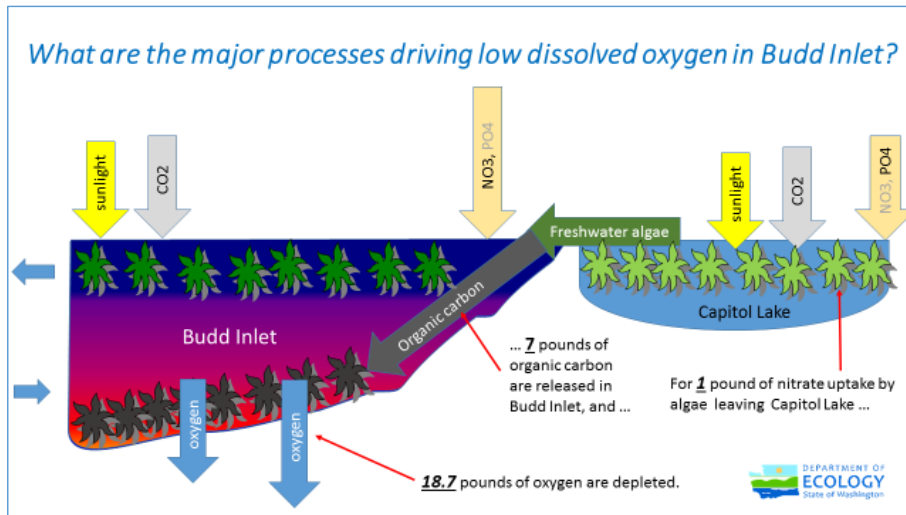


Figure 1: Major Processes affecting Dissolved Oxygen

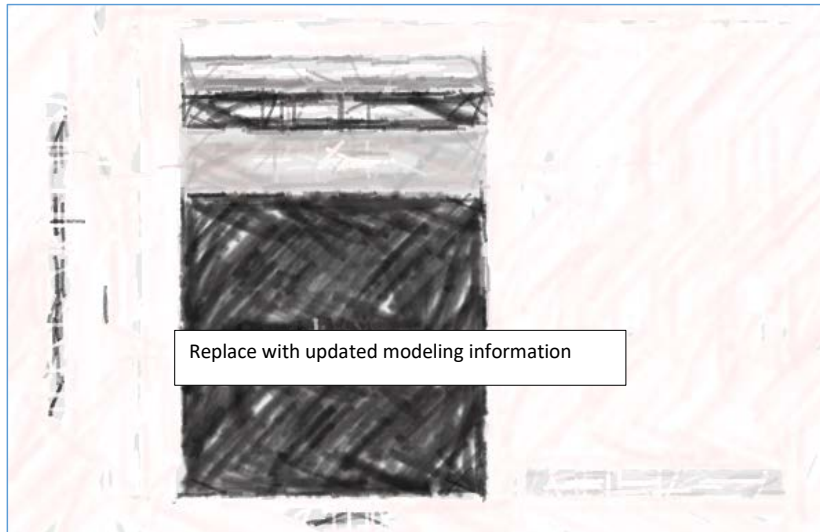


Figure 2: Sources of Dissolved Oxygen Depletion

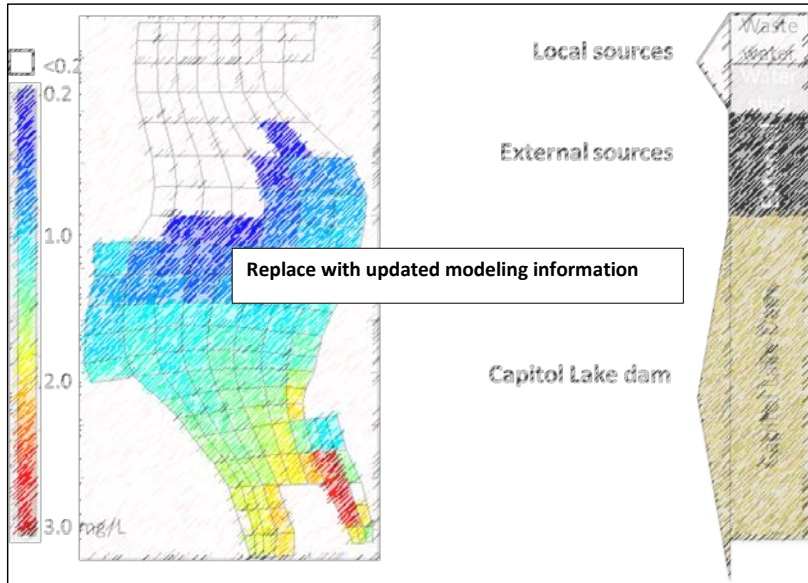


Figure 3: Human activities cause dissolved oxygen to decline as much as 3 mg/L below natural conditions.

Capitol Lake

This TMDL is not addressing 303(d) listings in Capitol Lake. However, Capitol Lake does affect significantly affect the water quality in Budd Inlet.

Capitol Lake is designated as Lake Class. To address DO, the WQS applied are that human actions considered cumulatively may not decrease the DO concentration more than 0.2 mg/L below natural conditions. Without the dam in place, the area currently covered by Capitol Lake would revert to the standard for southern Budd Inlet, which is Good Quality (5.0 mg/L). If naturally concentrations fall below 5.0 mg/L, then the standard is also that the combined effects of all human activities must not cause more than a 0.2 mg/L decrease below that naturally lower oxygen condition.

A watershed management program for Capitol Lake would not improve water quality due to the physical shape of the lake and relative size of the Deschutes River watershed. Human phosphorus contributions cause oxygen concentrations to change in Capitol Lake by more than 0.2 mg/L. Strong stormwater and other nonpoint source reductions could reduce phosphorus loads. Even if all human phosphorus sources were controlled, natural phosphorus concentrations from the large Deschutes River and local watersheds would deliver ample nutrients to support excessive suspended plant growth in the shallow waters of Capitol Lake. Watershed controls are still important to support healthy functions in the riverine environments. These controls should happen even though they would not benefit Capitol Lake itself.

Previous modeling data indicates the Capitol Lake dam causes the largest negative impact on DO in Budd Inlet of any activity evaluated. This is due to the dam's combined effects of changing circulation as well as nitrogen and carbon loads.

With Capitol Lake in place, more of Budd Inlet and Capitol Lake would violate standards for DO under critical conditions than with a restored Deschutes estuary. If the lake were to revert to an estuary, a smaller portion of Budd Inlet would violate standards for DO.

Total phosphorus concentrations are highest in the winter months and likely are associated with high discharge events and particulates. Capitol Lake nutrient concentrations reflect seasonal influences. The lake is phosphorus limited fall through spring. During the summer months, primary productivity reduces both dissolved inorganic nitrogen (DIN) and orthophosphate to very low levels.

2: Identify all relevant individual and general permittees

Permittee Name	Permit #	Permit Type	Permit Manager	Office
Boston Harbor STP	WA0040291	Muni NPDES IP	Vicky Epp	WQ/SWRO
Dunlap Tow Olympia Log Yard/Chip Reld	WAR000106	ISWGP	Paul Stasch	WQ/SWRO
Enterprise Services, WA Dept. of (DES) ²	WAR045210	MSWGP	Rian Sallee	WQ/VFO
Enterprise Services, WA Dept. of (DES)	No permit	None – responsible for management of Capitol Lake	None	WQ/SWRO
Fish and Wildlife, WA Dept. of (WDFW) (Pioneer Park)	Pending	Upland Fish Hatchery GP	Paul Stasch	WQ/SWRO
LOTT Budd Inlet Water Reclamation Facility	WA0037061	Muni NPDES IP	Dave Dougherty	WQ/SWRO

² The DES is a secondary permittee under the Phase II permit for the Capitol Campus.

Olympia, (Port of) Budd Inlet	WA0040533	Industrial NPDES IP	Mohsen Kourehdar	TCP/SWRO
Olympia, (Port of) Ocean Terminal	WAR001168	ISWGP	Paul Stasch	WQ/SWRO
Olympia, City of	WAR045015	MSWGP	Rian Sallee	WQ/VFO
Olympia, Port of	WAR045206	MSWGP	Rian Sallee	WQ/VFO
Seashore Villa STP	WA0037273	Muni NPDES IP	Dave Dougherty	WQ/SWRO
Tamoshan STP	WA0037290	Muni NPDES IP	Vicky Epp	WQ/SWRO
Thurston County ³	WAR045025	MSWGP	Rian Sallee	WQ/VFO
Transportation, WA State Dept. of (WSDOT)	WAR043000	Phase 1 Muni SW	Foroozan Sahib	WQ/HQ
Various ⁴	Various	CSWGP	Sam Knox	WQ/SWRO

Table 2: Permittees

We anticipate adding additional permittees to this table. New computer model runs will identify which wastewater treatment plants (WWTPs) impact dissolved oxygen in Budd Inlet. These could be located within the jurisdictional boundaries of Ecology's Northwest or Southwest Regions.

Acronyms

CSWGP: Construction Stormwater General Permit
GP: General Permit
HQ: Headquarters
IP: Individual Permit
ISWGP: Industrial Stormwater General Permit
MSWGP: Municipal Stormwater Phase II Western Washington General Permit
Muni: Municipal

NPDES: National Pollutant Discharge Elimination System
STP: Sewage Treatment Plant
SW: Stormwater
SWRO: Southwest Regional Office
TCP: Toxics Cleanup Program
VFO: Vancouver Field Office
WQ: Water Quality

3: Identify existing data and sources that will be considered in the TMDL

Document Title	Publication No.	Date
Deschutes River, Capitol Lake, and Budd Inlet Total Maximum Daily Load Study: Supplemental Modeling Scenarios (https://fortress.wa.gov/ecy/publications/SummaryPages/1503002.html)	15-03-002	September 2015
Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Technical Report: Water Quality Study Findings (https://fortress.wa.gov/ecy/publications/summarypages/1203008.html)	12-03-008	June 2012
Pending data: EAP staff will conduct additional computer modeling for Budd Inlet. See 5: Study Design Criteria for more information.		

Table 3: Data sources

4: Identify Project Team Members

Resources

Name	Office	Expertise
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³ The geographic area of coverage is the urbanized areas and urban growth areas associated with cities under the jurisdictional control of the county.

⁴ All current and future construction sites within the TMDL boundary.

Ahmed, Anise	EAP	TMDL Technical Project, modeling, project knowledge, writing technical analysis
Consultant ⁵	Under Consideration	Temporary assistant with research, meetings, and related work to develop WLAs for wastewater treatment plants (WWTPs) impacting the Budd Inlet marine waters. Liaison between Ecology Northwest and Southwest Regions and WWTPs.
Kolosseus, Andrew	WQ/SWRO	Unit Supervisor
TBD	WQ/SWRO	TMDL Project lead, meeting coordination and facilitation, presentation development, identifying implementation actions, coordination with internal and external stakeholders, TMDL process coordination, report writing

Table 4: Team Members

Additional resources (as needed and where appropriate)

Name	Office	Expertise
Bartlett, Heather	WQ/HQ	Program level management decisions
Bennett, Dave	SWRO	Communications and media outreach
Bresler, Helen	WQ/HQ	Policy related issues
Dent, Diane	WQ/HQ	Publications, website postings, and EPA submittal preparation
Doenges, Rich	WQ/SWRO	Section level management decisions
Dougherty, Dave	WQ/SWRO	Wastewater Treatment Plant permits
Figueroa-Kaminsky, Cristiana	EAP	Unit level management decisions related to modeling work
Fleskes, Robin	WQ/SWRO	Formatting, reviewing, and editing draft report; ensure consistency with program and agency standards
Henley, Mark	WQ/NWRO	Unit level management (WWTPs)
Knox, Sam	WQ/SWRO	Construction Stormwater General Permit
Kolosseus, Andrew	WQ/SWRO	Unit level management decisions
Kourehdar, Mohsen	TCP/SWRO	Individual permit
Pelletier, Greg	EAP	TMDL Technical Project, modeling, project knowledge
Rau, Ben	WQ/HQ	Nonpoint sources best management practices
Sallee, Rian	WQ/SWRO	Municipal Stormwater Permit
Stasch, Paul	WQ/SWRO	Industrial Stormwater and Aquaculture General Permits
Svrjcek, Ralph	WQ/NWRO	Point of contact for external sources located in the NW Region
Toteff, Sally	SWRO	Regional level management coordination, input, and liaison
Bilhimer, Dustin	WQ/HQ	South Puget Sound
Zentner, Greg	WQ/SWRO	Unit level management (WWTPs)

Table 4: Additional Resources

EAP: Environmental Assessment Program

HQ: Headquarters

⁵ We are considering hiring an outside consultant to assist with working directly with Ecology and affected wastewater treatment plants (WWTP) to discuss potential wasteload allocations (WLA). These discussions will result in developing and assigning WLAs. The WWTPs could be located in either Ecology's Northwest or Southwest Regions. If we choose this option, we will develop a separate detailed scope and schedule.

NWRO: Northwest Regional Office
SWRO: Southwest Regional Office

TCP: Toxics Cleanup Program
WQ: Water Quality

5: Study Design Criteria

This project plan addresses dissolved oxygen issues impacting Budd Inlet. The geographic boundary is the marine waters of Budd Inlet. Additional computer model runs are needed and will be conducted in three phases, with the objective of determining wasteload allocations and load allocations that will meet WQS.

Model Run Phase 1: Four new scenarios look at the “big picture” view of the impacts to Budd Inlet. Completed by **July 2016**.

Commented [LCW1]: We need to revise this date and the timeline from this point forward. Check with EAP for a reasonable schedule. We'll need to revise the GANTT chart.

Element Order	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Local Budd Inlet nonpoint sources (total impact = 0.08 mg/L)	Add in 80% of existing sources (represents 20% reduction)	Add in 50% of existing sources (represents 50% reduction)	Add in 50% of existing sources (represents 50% reduction)	Add in 50% of existing sources (represents 50% reduction)
LOTT & other Budd Inlet WWTPs (total impact = 0.17 mg/L)	Add in existing LOTT discharge (represents no changes to LOTT)	Add in LOTT discharges: on Oct–May and off Jun–Sep; small WWTPs max nitrogen 10 mg/L	Add in LOTT discharges: on Oct–Feb and off Mar–Sep; small WWTPs max nitrogen 10 mg/L	Add in LOTT discharges: on Oct–Feb and off Mar–Sep; small WWTPs max nitrogen 10 mg/L
Capitol Lake dam	Set aside 0.02 mg/L	Set aside 0.02 mg/L	Set aside 0.01 mg/L	Set aside 0.01 mg/L
External sources (total impact = 0.39 mg/L)	Add in 10% of external sources (represents 90% reduction)	Add in 50% of external sources (represents 50% reduction)	Add in 90% of external sources (represents 10% reduction)	Add in 10% of external sources (represents 90% reduction)

Table 5: Phase 1 Scenarios

Model Run Phase 2: This phase will turn on/off rivers and WWTPs on a source by source basis. The goal is to determine which ones are impacting Budd Inlet. This effort will identify any external sources located north of Boston Harbor. Completed by **February 2017**.

Model Run Phase 3: *Contingent on the results from Phase 2.* This phase will look at potential solutions to meet WQS and will be used to determine WLAs. This will be an iterative process to attain WQS. Completed by **October 2017**.

5½: What we need from the Environmental Assessment Program?

We need the following from EAP:

1. A plan with a schedule for completing #2 through #8, listed below.
2. A calibrated model sufficient for use in a TMDL.
3. Wasteload allocations for all entities listed in table 2 (including any sources outside of Budd Inlet that affect Budd Inlet). Wasteload allocations need to be in pounds of nutrients per day, plus any additional

metric deemed necessary for permitting. The allocation for DES's operation of Capitol Lake may be in dissolved oxygen deficit per day (DOD/day) or some similar metric.

4. Load allocations for all nonpoint sources, including any rivers, creeks, and groundwater discharging to Budd Inlet or other marine waters if they affect Budd Inlet. Load allocations need to be in pounds of nutrients per day, plus any additional metric deemed necessary for implementation.
5. Complete all other technical work necessary for an approvable TMDL.
6. Written sections of the technical pieces of the TMDL, in conjunction with WQP staff. This includes all of the parts that are entirely EAP's, as well as significant parts of the WLA and LA, margin of safety, and seasonal variation sections. Interim documents may be developed as appropriate.
7. Ongoing coordination with WQP and EPA on technical issues through the life of the project. This will likely take the form of regularly-scheduled periodic meetings (weekly or monthly).
8. Ongoing support for stakeholder outreach such as attending meetings and responding to public comments.

6: Identify Potential Policy Issues/Program Decisions, and Significant Challenges

Policy Issues/Program Decisions

Cell size for Budd Inlet model runs
Completed. EAP will combine model cells to match the size of 303(d) listing grids. EAP will also combine layers (details TBD). <i>(More information is available in the March 16, 2016 email to Mindy Roberts with the attachment, "Compliance Cell Size, August 2015".)</i>
Financial Impacts
We need to understand the potential costs to LOTT Clean Water Alliance and DES for any large scale changes need to upgrade their systems. How will the potential WLAs affect them? If the TMDL indicates removing the Capitol Lake dam is needed to meet water quality standards, what are the financial and operational impacts to DES? They are responsible for overseeing the management of both lake and dam. In 2016 the DES is undergoing a study to examine the long-term management and options. We also need to factor in potential impacts to other WWTPs identified through the additional model runs.
Water Quality Trading
Is this a viable option to consider? Is there a precedent with other TMDLs in Washington or elsewhere? Identify most likely candidates, for example LOTT, who could benefit from this action. <i>(Contact: Helen Bresler, WQ/HQ)</i>
Wasteload allocations (WLA)
This report will establish WLAs for the DES, LOTT, and the Boston Harbor, Seashore Villa, and Tamoshan WWTPs. This report will also establish WLAs to external sources if the additional Budd Inlet modeling confirms they are also contributors.
Connection to other inlets <i>(for example: Case, Carr, Eld):</i> These will get identified through the additional Puget Sound model runs. Sources outside of Budd Inlet may also impact other inlets as well.
New advisory group stakeholders: We will need to reach out to any WWTPs that were not already identified in previous work on this project.

Table 6: Issues/Decisions

Significant Challenges

Reasonable Assurances
Under the Clean Water Act, Ecology can only allow loading from a permitted point source such as wastewater treatment plant (WWTP) if there is “reasonable assurance” that the non-permitted activities, such as other anthropogenic sources impacting Capitol Lake, are adequately addressed. It may be challenging to provide this reasonable assurance considering the political, financial, and public relations issues surrounding the Capitol Lake versus Deschutes Estuary debate.
Capitol Lake versus Deschutes Estuary
There are two local groups with specific interests in the outcome of this issue. The Capitol Lake Improvement and Protection Association (CLIPA) is a firm supporter of the lake and dam and want to see them remain. The Deschutes Estuary Restoration Team (DERT) prefers removal of the dam to allow natural restoration of a tidal estuary. Both groups are actively involved with the DAG and community outreach and education. They are engaged with local legislators to gain support and understanding for their perspectives.
The Washington State Department of Enterprise Services (DES) is the responsible agency for managing the lake. The DES will need to identify how to achieve there allocation. They have a different process underway looking at potential long-term management options for Capitol Lake. More information about their responsibilities and process is available at http://www.des.wa.gov/about/pi/CapitolLake/Pages/default.aspx .

Table 7: Challenges

7: Project schedule with short and long-term deadlines⁶ (see spreadsheet)

Task	Timeline
Deschutes Advisory Group (DAG) meetings: Conduct meetings to share information with participants on issues related to the entire water cleanup project. This includes discussing implementation actions underway or completed for the Deschutes River, Percival Creek, and Budd Inlet Tributaries Multi-Parameter TMDL, identifying implementation actions for the Budd Inlet Dissolved Oxygen TMDL, and reviewing and providing feedback on the TMDL. 2016 meetings coordinated and facilitated by Lydia Wagner, WQP. <ul style="list-style-type: none"> Explain and discuss draft WLAs. Lead staff: TBD, WQP Identify and develop implementation actions needed by stakeholder organizations. Lead staff: TBD, WQP Provide preview of draft Budd Inlet Dissolved Oxygen TMDL. Lead staff: TBD, WQP 	2016: Jan, Mar, May, July, Sep, Nov 2017: Jan, Mar, May, July, Sep, Nov 2018: Jan, Mar, May, July, Sep, Nov 2019: as needed <ul style="list-style-type: none"> 2017 May 2017 – April 2018 2018: August
Budd Inlet Modeling⁷: Additional computer modeling to determine the external sources impacts to Budd Inlet. Includes three phases with each subsequent phase building on data from the previous phase. Lead staff: Anise Ahmed, EAP <ul style="list-style-type: none"> Technical analysis and results written and incorporated into the draft TMDL. 	Phase 1: March – July 2016 Phase 2: Sept 2016 – Feb 2017 Phase 3: May – Oct 2017 <ul style="list-style-type: none"> Completed by Nov 2017

⁶ See the Budd Inlet Dissolved Oxygen TMDL Timeline for more details.

⁷ See Section 5. Study Design Criteria of this Project Plan for more information.

Permitted Stakeholder meetings: These are specific to affected permittees to discuss potential and draft WLAs assigned to them. Stakeholders include all permittees previously identified in Table 2. Lead staff: Facilitated by either WQP staff or consultant.	July 2016 – October 2017
Develop the Budd Inlet Dissolved Oxygen TMDL. This effort includes determining the load allocations (LA) for nonpoint sources, determining the wasteload allocations (WLA) for point sources, and identifying implementation actions to achieve project goals. We will use results from the modeling to identify new stakeholders who are affected by this project and develop the WLAs. We will use existing information and input from stakeholders at the DAG to develop the implementation actions. Work on the draft TMDL can begin now and get updated as needed.	2016 -2019
Public Outreach: Developing the communication strategy, website postings, public meetings, presentations, and preparing the Responses to Comments. Lead Staff: TBD, WQP <ul style="list-style-type: none"> • Communication strategy • Public comment period • Prepare Responses to Comments 	July 2018 –March 2019 <ul style="list-style-type: none"> • July-August 2018 • September-October 2018 • November 2018 – March 2019

Table 8: Project Schedule

8: Communication Strategy *(Coordinate with Dave Bennett, Regional Communications Consultant)*

Task	Timeline
Develop detailed communication strategy ⁸	2018: July-August (or sooner if needed)
Deschutes Advisory Group (DAG)	As needed
Website postings	As needed
Email updates	As needed
Government-to-Government meetings <i>(with EPA and the Squaxin Island Tribe)</i>	2018: June-July 2019: Apr-May
Permitted stakeholder meetings prior to or during public comment period <i>(Scheduled upon request.)</i>	2018: Aug-Oct
Update Frequently Asked Questions (FAQ) for website publication simultaneous with public comment period	2018: Aug
Public comment & review process <i>(public meetings; draft document online; repository copies)</i>	2018: Sep-Oct

Table 9: Communication Strategy

9. Resources & Publications

1	Budd Inlet TMDL website	http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/Phase2.html
2	Deschutes Advisory Group website	http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/advgrp.html
3	Deschutes River Watershed main website	http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/index.html
4	Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily	https://fortress.wa.gov/ecy/publications/summarypages/1203008.html

⁸ Comprehensive strategy to include key talking points targeted for stakeholders, decision makers, media, and the public.

	Load Water Quality Study Findings (Ecology Publication)	
5	Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan (Ecology Publication)	https://fortress.wa.gov/ecy/publications/summarypages/1510012.html
6	Deschutes River, Capitol Lake, and Budd Inlet Total Maximum Daily Load Study: Supplemental Modeling Scenarios (Ecology publication)	https://fortress.wa.gov/ecy/publications/SummaryPages/1503002.html
7	Frequently Asked Questions website	http://www.ecy.wa.gov/programs/wq/tmdl/deschutes/qa.html
8	Permitting and Reporting Information System (PARIS) Database <i>(to identify water quality permits in any watershed)</i>	http://ecydbicywqdp1/wq/f?p=106:1:1957357814001090

Table 10: Resources & Publications